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ATTN: Document Control Desk
U.S. Nuclear Regulatory Commission
Washington, DC 20555-0001

Edwin I. Hatch Nuclear Plant - Units 1 and 2
Response to Request for Additional Information Regarding
License Amendment Request to Revise Technical Specifications
to Adopt Risk Informed Completion Times TSTF-505, Revision 2,
"Provide Risk-Informed Extended Completion Times - RITSTF Initiative 4b"

Ladies and Gentlemen:

On October 26, 2021 [ADAMS Accession Number ML21300A153] and supplemented on April 29, 2022 [ML22119A144], pursuant to the provisions of Section 50.90 of Title 10 of the Code of Federal Regulations, Southern Nuclear Operating Company (SNC) requested amendments to Edwin I. Hatch Nuclear Plant, Units 1 and 2 (HNP) renewed facility operating licenses DPR-57 and NPF-5, respectively. The proposed amendment requested U.S. Nuclear Regulatory Commission (NRC) approval to modify Technical Specifications (TS) requirements to permit the use of Risk Informed Completion Times in accordance with TSTF-505, Revision 2, "Provide Risk-Informed Extended Completion Times - RITSTF Initiative 4b" [ML18183A493].

As part of their review of the license amendment request (LAR), NRC Staff transmitted requests for additional information (RAIs) on May 20, 2022 [ML22140A119] and June 6, 2022 [ML22157A354].

The Attachment to this letter provides responses to the RAIs referenced above.

SNC requests the same approval and implementation schedule as requested in its original application [ML21300A153]. The conclusions of the No Significant Hazards Consideration Determination and Environmental Consideration contained in the original application have been reviewed and are unaffected by this supplement.

In accordance with 10 CFR 50.91, SNC is notifying the State of Georgia of this RAI response by transmitting a copy of this letter, with attachment, to the designated State Official.

This letter contains no regulatory commitments. If you have any questions, please contact Amy Chamberlain at 205.992.6361.

I declare under penalty of perjury that the foregoing is true and correct. Executed on the 18th day of August 2022.

Respectfully submitted,

C. A. Gayheart
Director, Regulatory Affairs
Southern Nuclear Operating Company

CAG/ACC

Attachment: SNC Response to NRC Request for Additional Information

cc: Regional Administrator, Region II
NRR Project Manager – Hatch
Senior Resident Inspector – Hatch
Director, Environmental Protection Division – State of Georgia
RType: CHA02.004

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NL-22-0590

Attachment

SNC Response to NRC Request for Additional Information

SNC Response to NRC Request for Additional Information

Nuclear Regulatory Commission (NRC) Staff transmitted requests for additional information (RAIs) via emails dated May 20, 2022 [ML22140A119] and June 6, 2022 [ML22157A354]. The RAIs were regarding SNC's license amendment request (LAR) for Hatch Nuclear Plant (HNP) Units 1 and 2 to adopt Technical Specifications Task Force (TSTF) traveler TSTF-505, Revision 2, "Provide Risk-Informed Extended Completion Times – RITSTF Initiative 4b" dated October 26, 2021 [ML21300A153]. The NRC Staff's RAIs are below; SNC's responses are provided following each RAI.

Probabilistic Risk Assessment Licensing Branch C (APLC) RAI Questions

APLC-RAI-1 - Impact of Portable FLEX Equipment on Seismic Penalty

The NRC memorandum dated May 30, 2017, "Assessment of the Nuclear Energy Institute [NEI] 16-06, 'Crediting Mitigating Strategies in Risk-Informed Decision Making,' Guidance for Risk-Informed Changes to Plants Licensing Basis" (ADAMS Accession No. ML17031A269), provides the NRC staff's assessment of challenges to incorporating FLEX equipment and strategies into a probabilistic risk assessment (PRA) model in support of risk-informed decision-making in accordance with the guidance of Regulatory Guide (RG) 1.200, Revision 2 (ADAMS Accession No. ML090410014). With regards to equipment failure probability, in the memorandum dated May 30, 2017, the NRC staff concludes (Conclusion 8):

> "The uncertainty associated with failure rates of portable equipment should be considered in the PRA models consistent with the American Society of Mechanical Engineers/American Nuclear Society (ASME/ANS) PRA Standard as endorsed by RG 1.200. Risk-informed applications should address whether and how these uncertainties are evaluated."

With regards to human reliability analysis (HRA), NEI 16-06, "Crediting Mitigating Strategies in Risk-Informed Decision Making," dated August 26, 2016 (ADAMS Accession No. ML16286A297), Section 7.5 recognizes that the current HRA methods do not translate directly to human actions required for implementing mitigating strategies. Sections 7.5.4 and 7.5.5 of NEI 16-06 describe such actions to which the current HRA methods cannot be directly applied, such as debris removal, transportation of portable equipment, installation of equipment at a staging location, routing of cables and hoses; and those complex actions that require many steps over an extended period, multiple personnel and locations, evolving command and control, and extended time delays. In the memorandum dated May 30, 2017, the NRC staff concludes (Conclusion 11):

> "Until gaps in the human reliability analysis methodologies are addressed by improved industry guidance, [Human Error Probabilities] HEPs associated with actions for which the existing approaches are not explicitly applicable, such as actions described in Sections 7.5.4 and 7.5.5 of NEI 16-06, along with assumptions and assessments, should be submitted to NRC for review."

Section 6 of Enclosure 2 to the LAR dated October 26, 2021, states that while Internal Events, Internal Flooding, and Fire PRA models credit only permanently installed FLEX equipment, portable FLEX equipment was credited in the Hatch Seismic PRA (SPRA) model. The Hatch SPRA is not directly used in the risk-informed completion time (RICT) program, but it is used to provide selected input into the calculation of the seismic core damage frequency (SCDF) and seismic large early release frequency (SLERF) penalty. It is unclear to the NRC staff how much of an impact the portable FLEX equipment would have on the evaluation of the SCDF and SLERF penalties. During the regulatory audit (ADAMS Accession No. ML21309A000) held on April 5 – 7, 2022, the licensee provided information on a FLEX sensitivity study for Hatch, Unit 1, that set the failure rates for portable FLEX equipment at 0.1/year and appeared to demonstrate that the uncertainty associated with the portable FLEX equipment does not significantly impact the bounding seismic penalty values. However, no information on a sensitivity study for Hatch, Unit 2, was provided nor were the base failure rates for the portable FLEX equipment. This information is needed to determine the overall impact of this source of uncertainty for this application.

Therefore, provide information on sensitivity studies for Hatch, Units 1 and 2, that address the impact of the portable FLEX equipment credited in the Hatch SPRA on the calculated SCDF and SLERF penalty values. Include the portable FLEX failure rates in both the base and sensitivity cases.

SNC Response to APLC-RAI-1 - Impact of Portable FLEX Equipment on Seismic Penalty

The portable FLEX equipment credited in the Hatch Nuclear Plant (HNP) SPRA has no direct impact on the calculated SCDF penalty. As discussed in the HNP RICT LAR (ML21300A153), the approach taken for the estimation of the SCDF penalty value is a mathematical convolution calculation of the current HNP seismic hazard curve with an estimate of the HNP plant-level seismic fragility. The assumed limiting plant level seismic capacity used in the Hatch seismic penalty calculation has a high confidence of low probability of failure (HCLPF) value of 0.30g peak ground acceleration (PGA) based on the HNP Individual Plant Examination of External Events (IPEEE) seismic analysis as documented in the HNP RICT LAR. The portable FLEX equipment credited in the SPRA has no impact on the plant-level HCLPF value based on the IPEEE. Therefore, the portable FLEX equipment credited in the Hatch SPRA has no impact on the calculated SCDF penalty. In addition, the portable FLEX equipment credited in the Hatch SPRA has no adverse impact on the SLERF penalty value as discussed in the following sections.

Table 1-1 lists the basic events for portable FLEX equipment credited in the Hatch SPRA Model of Record (MOR) including their basic event IDs, basic event descriptions, and nominal failure probabilities. For selected sensitivity cases, all of the portable FLEX equipment in Table 1-1 are not credited (i.e., set to TRUE) in order to calculate the impact on SCDF and SLERF.

Table 1-2 provides the SCDF and SLERF results for Unit 1 and Unit 2 for various cases. The main SPRA model (i.e., Case 1) used for the SPRA results comparison was described the Hatch Diesel Generator (DG) Liner LAR (ML20213C715), but also incorporates the various enhancements to the Flag and Recovery files as identified in the responses to RAIs 3a and 3b. Some of the conservatisms associated with the SPRA model from the DG Liner LAR include, but are not limited to, the following:

1. Due to computation limitations and the computational time required to quantify hazard intervals %G12 (1.2g to <1.5g), %G13 (1.5g to <2g), and %G14 (>2g), the Unit 1 and Unit 2 fault trees have been modified so that these hazard bins are modeled to lead directly to CDF and LERF (i.e., Incremental Conditional Core Damage Probability (CCDP) and Conditional Large Early Release Probability (CLERP) equal to 1.0). This treatment is conservative; however, these hazard bins have high CCDPs and CLERPs and are not top contributors to the seismic results in the MORs, so this change has only a small impact on the Incremental CCDP (ICCDP) and Incremental CLERP (ICLERP) results for the DG Liner LAR risk informed application.
2. In order to reduce the computation time for the seismic PRA quantification, the Electric Power Research Institute (EPRI) ACUBE software was not used. Use of the Factored Minimum Cut Upper Bound (FMCUB) approach provides a slightly higher calculated CDF and LERF compared to use of ACUBE. However, the difference is identified to be small and did not adversely impact the ICCDP and ICLERP results for DG Liner LAR risk informed application.

Although the conservatisms identified above did not adversely impact the ICCDP and ICLERP results for the EDG CT risk informed application, the conservatisms resulted in a significant perceived increase in the base SCDF, base SLERF, and base SCLERP.
Table 1-2 provides the results for the following cases:

1. Case 1: Credit portable FLEX equipment. This is the nominal SPRA model (i.e., no DG Out of Service (OOS)) developed for the Hatch DG Liner LAR (ML20213C715), but also

incorporates the various enhancements to the Flag and Recovery files as identified in the responses to RAIs 3a and 3b.

2. Case 2: Same as Case 1 but no credit for portable FLEX equipment.
3. Case 3: SPRA Model of Record (MOR) as documented in the Hatch RICT LAR.
4. Case 4: RICT seismic CDF and LERF penalty values as documented in the Hatch RICT LAR (same values apply to both Units 1 and 2).

Case 1a, with credit for portable FLEX equipment, shows that the Unit 1 SCDF and SLERF are 8.89E-07/yr and 2.32E-07/yr, respectively. Case 2a, which is the same as Case 1a except no credit for portable FLEX equipment (i.e., portable FLEX basic events set to TRUE), shows that the Unit 1 SCDF increases nearly 40% to 1.23E-06/yr, but there is a negligible increase in SLERF. The Case 2a SCDF of 1.23E-06/yr is slightly higher than the seismic penalty SCDF of 1.18E-06/yr from the Hatch RICT LAR shown in Case 4a. However, Case 2a is originally based on the SPRA model used for the DG Liner LAR , which incorporated conservatisms compared to the Hatch Seismic PRA MOR shown in Case 3a (H-RIE-SEIS-U00-001-002). If the SCDF of 6.8E-07/yr from the Hatch Unit 1 SPRA MOR (Case 3a) is also estimated to increase by approximately 40% when portable FLEX equipment is not credited, the SCDF would remain below the seismic penalty SCDF of 1.18E-06/yr. Therefore, the seismic penalty of 1.18E-06/yr for SCDF from the Hatch RICT LAR is evaluated to remain appropriate even when considering no credit for portable FLEX equipment. The Unit 2 results in Table 1-2 support a similar conclusion.

In addition, Table 1-2 supports that all SLERF cases remain below the seismic penalty of 2.95E-07/yr (i.e., Case 4a) for SLERF from the Hatch RICT LAR. Although Case 1b shows a Seismic Conditional Large Early Release Probability (SCLERP) of 0.31 for Unit 2, which is higher than the base SCLERP of 0.25 from the Hatch RICT LAR, Case 1b is based on the SPRA model used for the DG Liner LAR, which included conservatisms that increased the SLERF and associated SCLERP.

CONCLUSION

The results in Table 1-2 support that the portable FLEX equipment credited in the Hatch SPRA has no impact on the calculated SCDF and SLERF penalty values in the Hatch RICT LAR. Nevertheless, in order to address any remaining uncertainty associated with the seismic penalty and its use for the RICT program, the SCLERP for calculating the seismic LERF penalty will be set at 0.31 using the highest value shown for Case 1b in Table 1-2, which is based on the conservative SPRA model used in the Hatch DG Liner LAR.

For the Hatch RICT LAR, the seismic CDF penalty will remain at 1.18E-06/yr. However, the seismic LERF penalty will be increased from 2.95E-07/yr to 3.66E-07/yr (i.e., 1.18E-06/yr * 0.31= 3.66E-07/yr).

Use of the seismic penalty for RICT, combined with showing that the SCLERP, and thus the seismic LERF penalty, decreases with FLEX credit, addresses uncertainty with the FLEX data. Although the nominal probabilities for the portable FLEX equipment do not change the insights for the impact of FLEX for the RICT program, they are provided in Table 1-1.

Table 1-1
Portable FLEX Equipment Credited in Hatch SPRA Model of Record (MOR)

Basic Event ID	Basic Event Description	Nominal Probability	Sensitivity Case Probability
CC-FLEX-DGS-1	1/3, DGSS-FLEX-DG-A FAILS TO START	4.7E-03	Set to TRUE
CC-FLEX-DGS-2	2/3, DGSS-FLEX-DG-A DGSS-FLEX-DG-B FAIL TO START	1.25E-05	Set to TRUE
CC-FLEX-DGS-3	2/3, DGSS-FLEX-DG-A DGSS-FLEX-DG-C FAIL TO START	1.25E-05	Set to TRUE
CC-FLEX-DGS-4	3/3, DGSS-FLEX-DG-A DGSS-FLEX-DG-B DGSS-FLEX-DG-C FAIL TO START	4.28E-06	Set to TRUE
CC-FLEX-DGS-5	1/3, DGSS-FLEX-DG-B FAIL TO START	4.7E-03	Set to TRUE
CC-FLEX-DGS-6	2/3, DGSS-FLEX-DG-B DGSS-FLEX-DG-C FAIL TO START	1.25E-05	Set to TRUE
CC-FLEX-DGS-7	1/3, DGSS-FLEX-DG-C FAILS TO START	4.7E-03	Set to TRUE
CC-FLEX-DGS-8	1/3, DGLR-FLEX-DG-A FAILS TO RUN FOR 14 HRS	9.74E-03	Set to TRUE
CC-FLEX-DGS-9	2/3, DGLR-FLEX-DG-A DGLR-FLEX-DG-B FAIL TO RUN FOR 14 HRS	3.14E-05	Set to TRUE
CC-FLEX-DGS-10	2/3, DGLR-FLEX-DG-A DGLR-FLEX-DG-C FAIL TO RUN FOR 14 HRS	3.14E-05	Set to TRUE
CC-FLEX-DGS-11	3/3, DGLR-FLEX-DG-A DGLR-FLEX-DG-B DGLR-FLEX-DG-C FAIL TO RUN FOR 14 HRS	1.04E-05	Set to TRUE
CC-FLEX-DGS-12	1/3, DGLR-FLEX-DG-C FAILS TO RUN FOR 14 HRS	9.74E-03	Set to TRUE
CC-FLEX-DGS-13	2/3, DGLR-FLEX-DG-B DGLR-FLEX-DG-C FAIL TO RUN FOR 14 HRS	3.14E-05	Set to TRUE
CC-FLEX-DGS-14	1/3, DGLR-FLEX-DG-B FAILS TO RUN FOR 14 HRS	9.74E-03	Set to TRUE
CC-FLEXPORTPUMP-1	1/2, DPFS2FLEXPORTPUMPA FAILS TO START	1.85E-03	Set to TRUE
CC-FLEXPORTPUMP-2	1/2, DPFS1FLEXPORTPUMPB FAILS TO START	1.85E-03	Set to TRUE
CC-FLEXPORTPUMP-3	2/2, DPFS1FLEXPORTPUMPA DPFS1FLEXPORTPUMPB FAIL TO START	1.23E-04	Set to TRUE
CC-FLEXPORTPUMP-4	1/2, DPFR1FLEXPORTPUMPA FAILS TO RUN 14 HRS	9.15E-04	Set to TRUE
CC-FLEXPORTPUMP-5	1/2, DPFR1FLEXPORTPUMPB FAILS TO RUN 14 HRS	9.15E-04	Set to TRUE
CC-FLEXPORTPUMP-6	2/2, DPFR1FLEXPORTPUMPA DPFR1FLEXPORTPUMPB FAIL TO RUN 14 HRS	3.3E-05	Set to TRUE

Table 1-2
Seismic PRA Results to Compare Impact of Crediting Portable FLEX Equipment

Hatch Unit 1 Seismic PRA Results				
Case No.	Description	CDF (/yr)	LERF (/yr)	SCLERP
Case 1a	With credit for portable FLEX equipment. (Nominal SPRA model with enhancements to Flag and Recovery files consistent with response to RAI 3a and 3b)	8.89E-07	2.32E-07	0.26
Case 2a	Same as Case 1 but no credit for portable FLEX equipment	1.23E-06	2.32E-07	0.19
Case 3a	SPRA MOR (with credit for portable FLEX equipment) documented in RICT LAR	6.8E-07	1.4E-07	0.21
Case 4a	Seismic Penalty documented in RICT LAR	1.18E-06	2.95E-07	0.25
Hatch Unit 2 Seismic PRA Results				
Case No.	Description	CDF (/yr)	LERF (/yr)	SCLERP
Case 1b	With credit for Portable FLEX equipment. (Nominal SPRA model with enhancements to Flag and Recovery files consistent with response to RAI 3a and 3b)	8.21E-07	2.53E-07	0.31
Case 2b	Same as Case 1 but no credit for Portable FLEX equipment	1.10E-06	2.55E-07	0.23
Case 3b	SPRA MOR (with credit for Portable FLEX equipment) documented in RICT LAR	5.6E-07	1.4E-07	0.25
Case 4b	Seismic Penalty documented in RICT LAR	1.18E-06	2.95E-07	0.25

APLC-RAI-2 - Tornado Missiles

Section 2.3.1, Item 7, of NEI 06-09 (ADAMS Accession No. ML122860402) states that the "impact of other external events risk shall be addressed in the RMTS [risk-managed technical specifications] program," and explains that one method to do this is by documenting, prior to the RMTS program, "that the external events that are not modeled in the PRA are not significant contributors to configuration risk." The NRC staff's safety evaluation for NEI 06-09 (ADAMS Accession No. ML071200238) states that "[o]ther external events are also treated quantitatively, unless it is demonstrated that these risk sources are insignificant contributors to -configuration specific risk."

Table E4-4 of Enclosure 4 to the LAR dated October 26, 2021, indicates that the -tornado generated missile hazard is screened based on criteria "C1" (Event damage potential is < events for which plant is designed) of Table E4-5. Section 3 of Enclosure 4 to the LAR dated October 26, 2021, indicates that two nonconformances were identified, with one being corrected with a plant modification and the other, associated with service water systems, was evaluated and screened. However, the NRC staff reviewed a document, "Plant Hatch Tornado Missile Project Summary Report [SNC826314]," made available on the audit portal, which states that a Tornado Missile Risk Evaluation (TMRE) will need to be performed to conservatively estimate the risk of the remaining unprotected structures, systems, and components (SSCs) from tornado-generated missiles. The NRC staff notes that this risk appears to be related to -beyond design-basis events and that no TMRE documentation was provided in the application process. During the regulatory audit (ADAMS Accession No. ML21309A000) held on April 5 – 7, 2022, the licensee indicated that the TMRE has not been performed and that there are no current plans to perform the analysis since no non-conformances exist in the plant. The NRC staff notes that the LAR dated October 26, 2021, provides the 'C1' criterion (corresponding to the plant design basis) for screening tornadoes and associated missiles. However, the information provided in the LAR dated October 26, 2021, appears to address beyond-design-basis tornado missiles risk and the licensee indicated during the audit that it will further examine the screening criteria that will cover beyond-design-basis tornado missiles.

Therefore, provide updated screening criteria for the tornado missiles hazard at Hatch, Units 1 and 2. Include, in the response, justification if the screening criteria are sufficient and adequate for this hazard.

<u>SNC Response to APLC-RAI-2 - Tornado Missiles</u>

The HNP design and licensing bases do not include the requirement for protection against vertical missiles. Many of the SSCs potentially vulnerable to damage from vertical missiles were determined to have adequate protection. A set of SSCs was not evaluated for protection against vertical missiles; and these are the subject of the beyond design basis tornado missile risk associated with screening the tornado missile hazard. These SSCs are shown to be either protected (and thus supporting screening Criterion C1) or evaluated for risk impact (to support screening Criterion PS3)[1].

Appendix BB of Plant Hatch Tornado Missile Project Summary Report [SNC826314] provides a list of potentially vulnerable targets to vertical missiles; a few targets (IDs 9, 19, 30-31, and 35-36) have subsequently been evaluated as not vulnerable. The remaining SSCs are evaluated to determine their vulnerability to HNP's design basis missiles *traveling in the vertical direction*. SSCs which can be shown to be protected against or not damaged by such missiles are considered screened within the context of Criterion C1 of the HNP LAR Table E4-5. SSCs that cannot be shown to be protected against HNP design basis missiles traveling vertically are assessed probabilistically and screened using Criterion PS3 (i.e., EXT-C1, Criterion B) of HNP RICT LAR Table E4-5.

The evaluation and screening process is documented in SNC Calculation PRA-BC-H-22-004; the method and results are summarized here.

<u>Screening with Criterion C1</u>

Table 1 provides the list of SSCs vulnerable to vertical missiles. It is a subset of the SSCs in Appendix BB of SNC826314. Table 1 provides the results of the deterministic screening that was performed. Six sets of SSCs could not be screened using Criterion C1; they are again listed in Table 2.

The general methods used to screen SSCs potentially vulnerable to vertical missiles with respect to Criterion C1 are:

a. *Design basis missiles travelling vertically do not damage safety-related (SR) components.* The HNP design basis tornado missiles are:

   1) wood plank (4" x 12" x 12 ft. long, traveling at 300 mph) and

   2) automobile (4000 lbs, travelling at 50 mph).

   Per RG 1.76, Revision 1, the velocities of vertical missiles are defined in this assessment to be 67% of the maximum horizontal missile velocity.

b. *Damage to SR component has no or minimal impact on plant safe shutdown from at-power.* This may be shown through qualitative or semi-quantitative arguments, which may rely upon factors such as: (a) more realistic success criteria, such as that used in the HNP Full Power Internal Events (FPIE); (b) redundancy and diversity of SSCs that can perform the same safety function; and/or (c) ruggedness of the SSC.

[1] Screening Criteria are from Table E4-5 in the HNP TSTF-505 LAR (ML21300A153).

Table 1
SSCs Potentially Vulnerable to Vertical Missiles
From Table 3-1 of CALC PRA-BC-H-22-004

ID [1]	Description	Screen with C1	Comments
1-8	CST Level Switches for HPCI/RCIC swap to Torus	Yes	The switches and associated conduits are small targets, they are redundant, must fail in the actuated position, and are diverse to suppression pool high level actuation.
10	1N71F201	Yes	Valve is a relatively small target but in an uncovered valve pit. The valve only needs to open if the normally open (and protected) valve transfers closed. This is negligible risk.
11-14, 25, and 27	PSW TB Isolation Valves, except Unit 2 Division 2	Yes	Valves are protected by grating that will stop design basis missiles travelling vertically. Hatches in grating may not stop missiles, however the hatch opening is small, consists of (thinner) grating, and does not expose the valve operators to missiles. The pipes and mechanical portions of the valve are robust and are unlikely to be damaged to the point of failing to perform their function.
26 and 28	Unit 2 Division 2 PSW TB Isolation Valves	No	Valves are protected by grating that will stop design basis missiles travelling vertically. However, a thinner hatch grating may result in a missile penetrating the hatch and potentially impacting both operators or cables for 2P41F316B and 2P41F316D. These valves must close to isolate the TB to allow adequate PSW flow to SR loads (including the EDGs). Valve failure could result in one division of PSW failing.
15-18, 21-24	PSW Isolation Valves to EDGs and RB PSW Isolation Valves to RB	Yes	Valves are protected by grating that will stop design basis missiles travelling vertically. Hatches in grating may not stop missiles, however the hatch opening is small, consists of (thinner) grating. Valves do not need to change position;. the pipes and mechanical portions of the valve are robust and are unlikely to be damaged to the point of failing to perform their function.

Table 1 (continued)
SSCs Potentially Vulnerable to Vertical Missiles
From Table 3-1 of CALC PRA-BC-H-22-004

ID [1]	Description	Screen with C1	Comments
20	2N71F013	Yes	Valve is a relatively small target but the grating over the valve pit is thin. The valve only needs to open if the normally open (and protected) valve transfers closed. This is negligible risk.
29	U2 N_2 Tank	No	Large surface area and supports both units. Not able to screen deterministically.
32-34	Intake Structure Fans (on Roof)	No	Grating protects against missiles, but vent hoods could be crushed. 1 of 3 fans required.
37-51	EDG FO Storage Tanks and Transfer Pumps	No	FO transfer pumps are vulnerable to missile strike through relatively thin manhole cover.
53a	EDG Battery Room Fans	Yes	Grating protects against missiles and ventilation not needed for success
53b	EDG Switchgear Room Fans	Yes	Grating protects against missiles and ventilation not needed for success
53c	EDG Oil Storage Room Fans	Yes	Grating protects against missiles and ventilation not needed for success
53d	EDG Room Main Exhaust Fans	No	Grating prevents missile penetration; however, ventilation hoods can be crushed. 1 of 2 fans required for success.
53e	EDG Exhaust Piping and Muffler	No	Muffler remains functional following missile strike; however, exhaust pipes have not basis calculations for functionality on tornado missile strike.

Notes to Table 1:
1. ID is from SNC926314-01, Appendix BB.

Screening with Criterion PS3 (EXT-C1, Criterion B)

SSCs that cannot be shown to be protected against HNP design basis missiles traveling vertically are assessed probabilistically and screened using Criterion PS3 (EXT-C1, Criterion B) of HNP RICT LAR Table E4-5. For screening tornado missiles, PS3 [EXT-C1, Criterion B] requires the design basis tornado hazard frequency be less than 1E-5/yr. Consistent with Enclosure 4, Section 3 of the HNP RICT LAR (ML21300A153), NUREG/CR-4461, Rev 2

(ML070810400) is used to determine the tornado hazard at HNP. F-Scale wind speeds from Table 6-1 of NUREG/CR-4461, Rev 2 are provided in Table 4-1. These are used to determine a conservative hazard frequency, based on the guidance in NEI 17-02 (ML17268A036). For the HNP 300 mph tornado wind speed, frequency = 4.55E-8/yr. This hazard frequency is significantly less than 1E-5/yr, as required by Screening Criterion PS3.

CCDP is calculated using a modified version of the HNP average maintenance FPIE PRA model. The FPIE PRA is adjusted to produce the following configuration for quantification of the CCDPs used in this assessment:

- Dual unit loss of offsite power (LOSP) initiated sequences only (all other initiators removed from the model quantification)
- Offsite AC power recovery disabled (i.e., no offsite AC recovery credited)
- SSCs protected from tornado missiles are not affected (i.e., no tornado missile induced failure modes added into the PRA model for these SSCs)
- Tornado missile failure basic events are added to the fault trees for all the SSCs not screened using Criterion C1 (i.e., those SSCs in Table 2). Basic event failure probabilities for tornado missile failures are also provided in Table 2.

Table 2
SSCs Considered in CCDP Calculation
From Table 3-1 of CALC PRA-BC-H-22-004

ID[1]	Description	Comments	Tornado Missile Failure Probability [2]
26 and 28	Unit 2 Division 2 Plant Service Water (PSW) Turbine Building (TB) Isolation Valves	Failure probability of both valves failing from single missile hit	7.4E-3
29	Unit 2 N_2 Tank	Tank is large and roof is engineered sheet metal. No credit taken for the tank, conservatively set to 1.0	1.0
32-34	Intake Structure Fans (on Roof)	Individual fan hood crushing probabilities (one for each of three fan hoods) and adjacent fan hood correlated crushing (A/B and B/C only).	Single fan: 2.9E-2 Double: 1.5E-2
37-51	Emergency Diesel Generator (EDG) Fuel Oil (FO) Storage Tanks and Transfer Pumps	Assume strike on manhole cover fails both transfer pumps. Fuel oil transfer is not needed for several hours and all pumps can be cross-tied to any tank, but conservatively not credited. Manhole cover is 1/8”. Included in DG failure probability for CCDP calculation.	5.3E-3 (each tank)
53d	EDG Room Main Exhaust Fans	Grating prevents missile penetration; however, ventilation hoods can be crushed. 1 of 2 fans required for success.	1.2E-2 per fan hood
53e	EDG Exhaust Piping and Muffler	Muffler remains functional following missile strike; however, exhaust pipes have not basis calculations for functionality on tornado missile strike.	2.2E-2 per EDG

Notes to Table 2:
1. ID is from SNC926314-01, Appendix BB.
2. Tornado Missile Failure Probabilities calculated in PRA-BC-H-22-004

The CCDP results are provided below in Table 3.

Table 3 - HNP Units 1 and 2 CCDPs
From Table 4-2 of CALC PRA-BC-H-22-004

Unit	CCDP
HNP1	2.17E-3
HNP2	2.37E-3

The CCDP for either unit is much less than the 0.1 Screening Criterion PS3 [EXT-C1, Criterion B], and thus tornado missiles are screened from HNP1 and HNP2.

APLC-RAI-3 – (Revised Audit Question 12)

Section 2.3.1, Item 7, of Nuclear Energy Institute (NEI) 06-09, "Risk Informed Technical Specifications Initiative 4b: Risk Managed Technical Specifications (RMTS), Revision 0-A, dated October 12, 2012 (ADAMS Accession No. ML122860402), states that the "impact of other external events risk shall be addressed in the risk management technical specification (RMTS) program" and explains that one method to do this is by "performing a reasonable bounding analysis and applying it along with the internal events risk contribution in calculating the configuration risk and the associated RICT [Risk-Informed Completion Time]." The NRC staff's safety evaluation (SE) for NEI 06-09 states that "Where PRA models are not available, conservative or bounding analyses may be performed to quantify the risk impact and support the calculation of the RICT."

In the license amendment request (LAR), the seismic penalty approach is used to quantify the risk impact and to support the RICT evaluation. Section 5 of Enclosure 4 to the LAR indicates that a seismic PRA (SPRA) for the Hatch plant was developed and that the Hatch SPRA was not directly used in the RICT program but provided input into the calculation for seismic core damage frequency (SCDF) and seismic large early release frequency (SLERF) penalty values. The licensee compared the estimated SCDF penalty for the proposed RICT calculations against the point-estimate SCDF from the site-specific SPRA. In addition, the licensee used the SLERF to SCDF ratio from the site-specific SPRA to determine the SLERF penalty for use in the proposed RICT calculations.

The comparison of the estimated SCDF and SLERF penalties against the corresponding point-estimate mean values from the site-specific SPRA does not provide justification that the SCDF and SLERF penalty estimates are conservative. There is no upper bound on the change-in-risk calculation, and the change in risk can exceed the base SCDF and SLERF. However, it appears to the NRC staff that the SPRA could provide the means to justify that the proposed SCDF and SLERF penalty estimates are conservative, consistent with the NRC staff's SE for NEI 06-09.

During the regulatory audit conducted on April 5 - 7, 2022, the licensee attempted to address this concern by referencing Table 3.5-1 and 3.5-2 in "License Amendment Request to Revise the Required Actions of Technical Specifications 3.8.1, AC Sources – Operating, for One-Time Extension of Completion Time for Unit 1 and Swing Emergency Diesel Generators," dated July 31, 2020 (ADAMS Accession No. ML20213C715). However, the NRC staff identified potentially non-conservative Incremental Conditional Core Damage Probability (ICCDP) and Incremental Conditional Large Early Release Probability (ICLERP) values listed in Table 3.5-1 for the diesel generator (DG) 1C seismic hazard, as well as other cases for other PRAs. As a result of this inquiry, the licensee reviewed its calculations and identified errors involved in the modeling and provided reevaluated results for Hatch, Unit 1, DG 1C on the portal for the NRC staff to review.

To allow the NRC staff to better understand the effect of these changes on the RICT program, the licensee is requested to address the following:

a. Briefly describe the modeling errors identified in the quantification results provided in Tables 3.5-1 and 3.5-2. Include in the response how each error was resolved across all hazards. Include identification of errors determined to impact the PRA models (i.e., internal events, internal floods, internal fire, seismic) and the real-time risk (RTR) model being used to support the review of the TSTF-505 LAR and confirm the resolution has been incorporated into the models as applicable.

b. For any changes to the PRA models identified in part(a) that are used to support the TSTF-505 LAR, provide detailed justification that there is no adverse impact on the RICT program. Ensure justification includes evaluation across all hazards and the affected Hatch, Units 2, DGs.

c. Confirm if the Hatch SPRA core damage frequency (CDF) and large early release frequency (LERF) point estimates provided in the TSTF-505 LAR are affected by the aforementioned modeling errors; if so, update the affected values in Section 5 of Enclosure 4 to the TSTF-505 LAR.

d. The NRC staff notes that information provided in Tables 3.5-1 and 3.5-2 indicates that the SCDF and SLERF penalty values proposed in the TSTF-505 LAR are conservative when compared to the change-in-risk calculations from the Hatch SPRA for all DGs, except for EDG 1C for Hatch, Unit 1. Provide updated Table 3.5-1 for DG 1C for Hatch, Unit 1, reflecting the resolution of the modeling errors. Also, confirm that any changes to the SPRA model identified in part (a) do not affect the conclusion regarding the conservatism of the SCDF and SLERF penalty values proposed in the TSTF-505 LAR.

SNC Response to APLC-RAI-3 – (Revised Audit Question 12)

Response 3a

When evaluating the results of the seismic model for the 1C emergency diesel system outages in Tables 3.5-1 and 3.5-2 of the Hatch DG Liner LAR, the NRC noted that the 1C DG OOS case evaluation resulted in a reduction in risk for the seismic hazard. Upon further investigation, SNC identified issues with the PRAQuant advanced tab settings, Flag file settings, and recovery file settings associated with the quantification of the various hazard groups for the DG Liner LAR.

Observations from the SNC investigation included the following:

1. In the U1 and U2 models, FLEX associated events set to a probability value in the flag files were not in the seismic cutsets. On further investigation, it was evident that the treatment of events set to 1.0 as TRUE described below, combined with the command **COMPRESS** 1 at the end of the seismic recovery file, were removing the events from the cutset so that a reviewer could not easily identify what was occurring.
2. Another cause of the seismic risk decrease with the 1C DG OOS case noted by the NRC was the incorrect selection of a seismic basic event for DG 1B availability and its use to represent the mode selector switch for supplying AC power to Unit 1 or Unit 2. The event in the seismic model represents the split fraction for the operator to align the swing diesel when the accident conditions are similar between the units and does not represent the alignment of the mode selector switch.
3. In the U1 and U2 internal events models, consequential recovery of AC power was in cutsets where recovery was not applicable.

The summary of the issues discussed above are provided in Table 3a-1. The issues were identified through comparing the base risk cutset with the DG OOS case and verifying the cutsets missing in the DG OOS case were due to events set to False in the flag file.

Tables 3a-2 through 3a-18 identify changes made to ensure the results were reasonable and all cutsets from base risk were in the DG OOS case for Unit 1, along with new cutsets containing an OOS DG event. Tables 3a-2 through 3a-18 compare the PRAQuant, Recovery rule and flag files from the original DG Liner LAR (i.e., left hand side of table) and updated evaluation (i.e., right hand side of table) to support this RAI response. The items changed are in red font, and the number on the side provides the line number in which change takes place.

PRAQuant and Recovery File Changes for Nominal Cases

PRAQuant and Recovery file changes are provided for the following hazards (in the following order):

1. Fire PRAQuant (Table 3a-2) and Recovery (Table 3a-3) files
2. Internal Flood PRAQuant (Table 3a-4) and Recovery (Table 3a-5) files
3. Internal Events PRAQuant (Table 3a-6) and Recovery (Table 3a-7) files
4. Seismic CDF and LERF PRAQuant (Tables 3a-8 and 3a-9) and Recovery (Table 3a-10) files

PRAQuant, Flag, and Recovery File Changes for 1C EDG OOS Cases

PRAQuant, Flag, and Recovery file changes are provided for the following hazards (in the following order):

1. Fire PRAQuant (Table 3a-11) and Recovery (Table 3a-12) files
2. Internal Flood PRAQuant (Table 3a-13) and Recovery (Table 3a-14) files
3. Internal Events PRAQuant (Table 3a-15) and Recovery (Table 3a-16) files
4. Seismic Flag (Tables 3a-17) and Recovery (Table 3a-18) files

Conclusion

The changes in the PRAQuant, Flag, and Recovery files are judged to result in relatively minor differences in the Unit 1 CDF and LERF results for both the nominal cases and the DG 1C OOS cases over all hazard groups. Similar changes were identified for both the Unit 2 nominal cases and the DG 2C OOS case over all hazard groups. The identified changes were entered into the SNC Corrective Action Program and will be tracked and integrated into the Hatch PRA model maintenance and update process.

Table 3a-1
Summary of Modeling Issues Identified for Hatch DG Liner LAR

No.	Issue	Software Application	Resolution	Change
1	The compression of events in the recovery rule file before applying recovery to cutsets is due to the Compress 1 statement at the end of the seismic recovery file. However, these events are PROB in the flag file.	Recovery File	Changes to Fire, Internal Flood, Internal Events, and Seismic recovery files.	Add line near top of Recovery file for: **SET EVENTS UNKNOWN** *
2	PRAQuant passing events set using PROB to QRecover as TRUE and triggering consequential offsite power recovery in inapplicable cutsets.	PRAQuant	Changes to Fire, Internal Flood, and Internal Events, PRAQuant file advanced settings.	Add line for: NoSendFailureList = True
3	The location in the recovery rule file for setting sequence flags to TRUE and creating non-minimal - erroneous results - cutsets and causing results to differ between the base and DG OOS cutsets.	Recovery File	Changes to Fire, Internal Flood, Internal Events, and Seismic recovery files.	Add line near top of Recovery file for: **SET EVENTS TRUE** SEQ*

Table 3a-1 (continued)
Summary of Modeling Issues Identified for Hatch DG Liner LAR

No.	Issue	Software Application	Resolution	Change
4	The location of the application-specific rule file for removing and applying recovery to cutsets relevant to offsite power recovery and applying PSW recovery.	Recovery File	Changes to Fire, Internal Flood, Internal Events, and Seismic recovery files.	Move recovery rules to be higher in the recovery file: **CHANGEEVENTS** +OPHE-REC-PSW-F portion for Fire recovery file, and **RECOVERY** DEL 0 portion for Internal Flood and Internal Events recovery file.
5	Use of an incorrect basic event to show that the 1B diesel is aligned to Unit 1 for 1A and 1C diesels out of service.	Flag File	Changes to Seismic flag file.	Remove line for: FL-DG1BALIGN-SPRA EQU .F.

Note: Tables 3a-2 through 3a-18 compare the PRAQuant, Recovery rule and flag files from the original DG Liner LAR (i.e., left hand side of table) and updated evaluation (i.e., right hand side of table) to support this RAI response. The items changed are in red font, and the number on the side provides the line number in which change takes place.

Table 3a-2
Identification of Changes in Fire PRA PRAQuant File for Nominal Cases

2	<Model FaultTreeFile="..\H1_CBM_REV_8_IFL_ASM.CAF" DatabaseFile="..\H1_CBM_REV_8_ASM.rr" MasterFlagFile="..\H1_CBM_REV_8_FLG_ABAO_ASM.FLG" CutsetFile="H1_CBM_REV_8_ABAO\" LogFile="ChangedCheckLog.txt" Initiators="%*" Intiators="%*" LocalFlags="%FLD*=False; %IE*=False; %G*=False" TrueEvent=".T." FalseEvent=".F." />	<>	2	<Model FaultTreeFile="..\H1_CBM_REV_8_IFL_ASM.CAF" DatabaseFile="..\H1_CBM_REV_8_ASM.rr" MasterFlagFile="..\H1_CBM_REV_8_FLG_ABAO_ASM.FLG" CutsetFile="H1_CBM_REV_8_ABAO-PC\" LogFile="ChangedCheckLog.txt" Initiators="%*" Intiators="%*" LocalFlags="%FLD*=False; %IE*=False; %G*=False" TrueEvent=".T." FalseEvent=".F." />

Table 3a-2 (continued)
Identification of Changes in Fire PRA PRAQuant File for Nominal Cases

3	<Options ACUBECount="1000" ACUBEEnabled="false" ClearLog="true" CompressAll="26" CurrentQuantifier="Quant_FTREX1901" CutsetFormat="2" DeleCurVal="true" ExpandMods="true" FalseEvent=".F" MaxRecoveries="6" PruneBeforeFlags="false" RunMissing="false" SaveAll="false" ShellWindowState="1" Singlefile="false" TrueEvent=".T" TruncateToZero="False" />		3	<Options ACUBECount="1000" ACUBEEnabled="false" ClearLog="true" CompressAll="26" CurrentQuantifier="Quant_FTRW6419" CutsetFormat="2" DeleCurVal="true" ExpandMods="true" FalseEvent=".F" MaxRecoveries="6" NoSendFailureList="True" PruneBeforeFlags="false" RunMissing="false" SaveAll="false" ShellWindowState="1" Singlefile="false" TrueEvent=".T" TruncateToZero="False" />

Table 3a-3
Identification of Changes in Fire PRA Recovery File for Nominal Cases

		-+	3 4	**SET EVENTS UNKNOWN** *
		-+	6 7	**SET EVENTS TRUE** SEQ*
		-+	9 10	**SUBSUME** **COMPRESS** 4
		-+	12 13 14 15 16 17 18 19 20	**CLEAR RECOVERY FLAGS** **MAX RECOVERIES** 1 ; ; add op action ; **CHANGEEVENTS** +OPHE-REC-PSW-F %HF_1101J* SEQ_SBO_28 -OPHE* -CC-SW-1 **CHANGEEVENTS** +OPHE-REC-PSW-F %HF_1101J* SEQ_SBO_5 -OPHE* -CC-SW-1
		-+	22 23	**SET EVENT PROBS** OPHE-REC-PSW-F .05

Table 3a-3 (continued)
Identification of Changes in Fire PRA Recovery File for Nominal Cases

		-+	25	**COMPRESS** 2
7	**CLEAR RECOVERY FLAGS**	+-		
9 10	**SUBSUME** **COMPRESS** 30	+-		
2478 2479 2480 2481 2482 2483 2484 2485 2486	**CLEAR RECOVERY FLAGS** **MAX RECOVERIES** 1 ; ; add op action ; **CHANGEEVENT S** +OPHE- REC-PSW-F %HF_1101J* SEQ_SBO_28 -OPHE* -CC- SW-1 **CHANGEEVENT S** +OPHE- REC-PSW-F %HF_1101J* SEQ_SBO_5 -OPHE* -CC- SW-1	+-		
2488 2489	**SET EVENT PROBS** OPHE-REC-PSW- F .05	+-		
2492	SEQ_*	+-		

Table 3a-4
Identification of Changes in Internal Flood PRA PRAQuant File for Nominal Cases

2	<Model FaultTreeFile="..\H1_CBM_REV_8_IFL_ASM.CAF" DatabaseFile="..\H1_CBM_REV_8_ASM.rr" MasterFlagFile="..\H1_CBM_REV_8_FLG_ABAO_ASM.FLG" CutsetFile="H1_CBM_REV_8_FLOOD\" LogFile="REV8-1TOP-IL-LOG.txt" Initiators="%*" Intiators="%*" LocalFlags="%HF*=False; %IE*=False; %G*=False" TrueEvent=".T." FalseEvent=".F." />	<>	2	<Model FaultTreeFile="..\H1_CBM_REV_8_IFL_ASM.CAF" DatabaseFile="..\H1_CBM_REV_8_ASM.rr" MasterFlagFile="..\H1_CBM_REV_8_FLG_ABAO_ASM.FLG" CutsetFile="H1_CBM_REV_8_FLOOD-PC\" LogFile="REV8-1TOP-IL-LOG.txt" Initiators="%*" Intiators="%*" LocalFlags="%HF*=False; %IE*=False; %G*=False" TrueEvent=".T." FalseEvent=".F." />

Table 3a-4 (continued)
Identification of Changes in Internal Flood PRA PRAQuant File for Nominal Cases

3	<Options ACUBECount="1000" ACUBEEnabled="false" ClearLog="true" CompressAll="26" CurrentQuantifier="Quant_FTREX64-SEIS" CutsetFormat="2" DeleCurVal="true" ExpandMods="true" FalseEvent=".F" MaxRecoveries="6" PruneBeforeFlags="false" RunMissing="false" SaveAll="false" ShellWindowState="1" Singlefile="false" TrueEvent=".T" TruncateToZero="False" />		3	<Options ACUBECount="1000" ACUBEEnabled="false" ClearLog="true" CompressAll="26" CurrentQuantifier="Quant_FTRW6419" CutsetFormat="2" DeleCurVal="true" ExpandMods="true" FalseEvent=".F" MaxRecoveries="6" NoSendFailureList="True" PruneBeforeFlags="false" RunMissing="false" SaveAll="false" ShellWindowState="1" Singlefile="false" TrueEvent=".T" TruncateToZero="False" />

Table 3a-5
Identification of Changes in Internal Flood PRA Recovery File for Nominal Cases

		-+	3 4	**SET EVENTS UNKNOWN** *
		-+	6 7	**SET EVENTS TRUE** SEQ_*
		-+	9 10	**SUBSUME** **COMPRESS** 4
		-+	12	**CLEAR RECOVERY FLAGS**
		-+	14	;Remove illegitimate cutsets. These cutsets have OSP recovery successful on the success branch of the sequence but no credit for OSP recovery on the failure branch
		-+	16 17 18	**RECOVERY** DEL 0 SEQ_LOSP-2 SEQ_OSPREC OPHE* SEQ_LOSP-5 SEQ_OSPREC OPHE*

Table 3a-5 (continued)
Identification of Changes in Internal Flood PRA Recovery File for Nominal Cases

		-+	25 26	**SET EVENTS UNKNOWN** *
10	**COMPRESS** 30	<>	31	**COMPRESS** 4
		-+	83	;These cutsets conservatively applied a 5 hour OSP recovery when 10 hours is warranted
		-+	85 86 87 88 89 90 91 92 93 94 95 96 97	**MAX RECOVERIES** 1 **RECOVERY** NR-OSP-5to10H 0.523 SEQ_LOSP-9 CONSEQ-NR1-5H SEQ_GT_10 CONSEQ-NR1-5H SEQ_GT_3 CONSEQ-NR1-5H SEQ_LOSP-13 CONSEQ-NR1-5H SEQ_LOSP-16 CONSEQ-NR1-5H SEQ_GT_16 CONSEQ-NR1-5H SEQ_LOSP-22 CONSEQ-NR1-5H SEQ_LOSP-19 CONSEQ-NR1-5H SEQ_GT_22 CONSEQ-NR1-5H SEQ_GT_19 CONSEQ-NR1-5H SEQ_LOSP-9 ZNR-OSP-5H

Table 3a-5 (continued)
Identification of Changes in Internal Flood PRA Recovery File for Nominal Cases

			98	SEQ_GT_10 ZNR-OSP-5H
			99	SEQ_GT_3 ZNR-OSP-5H
			100	SEQ_LOSP-13 ZNR-OSP-5H
			101	SEQ_LOSP-16 ZNR-OSP-5H
			102	SEQ_GT_16 ZNR-OSP-5H
			103	SEQ_LOSP-22 ZNR-OSP-5H
			104	SEQ_LOSP-19 ZNR-OSP-5H
			105	SEQ_GT_22 ZNR-OSP-5H
			106	SEQ_GT_19 ZNR-OSP-5H
		-+	108 109	**SUBSUME** **COMPRESS** 4

Table 3a-6
Identification of Changes in Internal Events PRA PRAQuant File for Nominal Cases

2	<Model FaultTreeFile="..\H1_CBM_REV_8_IFL_ASM.CAF" DatabaseFile="..\H1_CBM_REV_8_ASM.rr" MasterFlagFile="..\H1_CBM_REV_8_FLG_ABAO_ASM.FLG" CutsetFile="H1_CBM_REV_8_FPIE\" LogFile="Rev8-IE-Log.txt" Initiators="%*" Intiators="%*" LocalFlags="%HF*=False; %FLD*=False; %G*=False" TrueEvent=".T." FalseEvent=".F." />	<>	2	<Model FaultTreeFile="..\H1_CBM_REV_8_IFL_ASM.CAF" DatabaseFile="..\H1_CBM_REV_8_ASM.rr" MasterFlagFile="..\H1_CBM_REV_8_FLG_ABAO_ASM.FLG" CutsetFile="H1_CBM_REV_8_FPIE-PC\" LogFile="Rev8-IE-Log.txt" Initiators="%*" Intiators="%*" LocalFlags="%HF*=False; %FLD*=False; %G*=False" TrueEvent=".T." FalseEvent=".F." />

Table 3a-6 (continued)
Identification of Changes in Internal Events PRA PRAQuant File for Nominal Cases

3	<Options ACUBECount="1000" ACUBEEnabled="false" ClearLog="true" CompressAll="26" CurrentQuantifier="Quant_FTREX1901_X64_WRAP" CutsetFormat="2" DeleCurVal="true" ExpandMods="true" FalseEvent=".F" MaxRecoveries="6" NoOverrideProbs="false" PruneBeforeFlags="false" RunMissing="false" SaveAll="false" ShellWindowState="1" Singlefile="false" TrueEvent=".T" TruncateToZero="False" />		3	<Options ACUBECount="1000" ACUBEEnabled="false" ClearLog="true" CompressAll="26" CurrentQuantifier="Quant_FTRW6419" CutsetFormat="2" DeleCurVal="true" ExpandMods="true" FalseEvent=".F" MaxRecoveries="6" NoOverrideProbs="false" NoSendFailureList="True" PruneBeforeFlags="false" RunMissing="false" SaveAll="false" ShellWindowState="1" Singlefile="false" TrueEvent=".T" TruncateToZero="False" />

Table 3a-7
Identification of Changes in Internal Events PRA Recovery File for Nominal Cases

		-+	3 4	**SET EVENTS UNKNOWN** *
		-+	6 7	**SET EVENTS TRUE** SEQ_*
		-+	9 10	**SUBSUME** **COMPRESS** 4
		-+	12	**CLEAR RECOVERY FLAGS**
		-+	14	;Remove illegitimate cutsets. These cutsets have OSP recovery successful on the success branch of the sequence but no credit for OSP recovery on the failure branch
		-+	16 17 18	**RECOVERY** DEL 0 SEQ_LOSP-2 SEQ_OSPREC OPHE* SEQ_LOSP-5 SEQ_OSPREC OPHE*

Table 3a-7 (continued)
Identification of Changes in Internal Events PRA Recovery File for Nominal Cases

		-+	23 24	**SET EVENTS UNKNOWN** *
8	**COMPRESS** 30	<>	28	**COMPRESS** 4
		-+	33 34	**REPLACE EVENTS** OPHEELAP-ALTPWR-X 1.0 OPHEELAP-ALTPWR OPHEELAP-ALTPR-FLAG
		-+	48	**COMPRESS** 2
26 27	**REPLACE EVENTS** OPHEELAP-ALTPWR-X 1.0 OPHEELAP-ALTPWR OPHEELAP-ALTPR-FLAG	<>	50 51	
		-+	85	;These cutsets conservatively applied a 5 hour OSP recovery when 10 hours is warranted
		-+	87 88	**MAX RECOVERIES** 1 **RECOVERY** NR-OSP-5to10H 0.523

Table 3a-7 (continued)
Identification of Changes in Internal Events PRA Recovery File for Nominal Cases

			89	SEQ_LOSP-9 CONSEQ-NR1-5H
			90	SEQ_GT_10 CONSEQ-NR1-5H
			91	SEQ_GT_3 CONSEQ-NR1-5H
			92	SEQ_LOSP-13 CONSEQ-NR1-5H
			93	SEQ_LOSP-16 CONSEQ-NR1-5H
			94	SEQ_GT_16 CONSEQ-NR1-5H
			95	SEQ_LOSP-22 CONSEQ-NR1-5H
			96	SEQ_LOSP-19 CONSEQ-NR1-5H
			97	SEQ_GT_22 CONSEQ-NR1-5H
			98	SEQ_GT_19 CONSEQ-NR1-5H
			99	SEQ_LOSP-9 ZNR-OSP-5H
			100	SEQ_GT_10 ZNR-OSP-5H
			101	SEQ_GT_3 ZNR-OSP-5H
			102	SEQ_LOSP-13 ZNR-OSP-5H
			103	SEQ_LOSP-16 ZNR-OSP-5H
			104	SEQ_GT_16 ZNR-OSP-5H
			105	SEQ_LOSP-22 ZNR-OSP-5H
			106	SEQ_LOSP-19 ZNR-OSP-5H
			107	SEQ_GT_22 ZNR-OSP-5H
			108	SEQ_GT_19 ZNR-OSP-5H
		-+	110	**SUBSUME**
			111	**COMPRESS** 4

Table 3a-8
Identification of Changes in Seismic PRA CDF PRAQuant File for Nominal Cases

2	<Model FaultTreeFile="H1_IxxS_REV_8_ASM.caf" DatabaseFile="H1_CBM_REV_8_ASM.rr" RecoveryFile="CBM_RECV_U12_REV_8_SEISMIC.recv" MasterFlagFile="FRAGILITY.flg" CutsetFile="U1_Cutsets_Seismic\CDF\1E-10\" TrueEvent=".T." FalseEvent=".F." />	<>	2	<Model FaultTreeFile="H1_IxxS_REV_8_ASM.caf" DatabaseFile="H1_CBM_REV_8_ASM.rr" RecoveryFile="CBM_RECV_U12_REV_8_SEISMIC.recv" MasterFlagFile="FRAGILITY.flg" CutsetFile="U1_Cutsets_Seismic-PC\CDF\1E-10\" TrueEvent=".T." FalseEvent=".F." />

Table 3a-8 (continued)
Identification of Changes in Seismic PRA CDF PRAQuant File for Nominal Cases

3	<Options ACUBECount="500000" ACUBEEnabled="false" ACUBEOpts="/IMP /N" ClearLog="true" CurrentQuantifier="Quant_FTREX64-SEIS" DeleCurVal="true" ExpandMods="false" NoSendFailureList="True" RunAcubeExe="True" RunMissing="false" SaveAll="false" ShellWindowsState="True" Singlefile="false" />		3	<Options ACUBECount="500000" ACUBEEnabled="false" ACUBEOpts="/IMP /N" ClearLog="true" CurrentQuantifier="Quant_FTRW6419" DeleCurVal="true" ExpandMods="false" NoSendFailureList="True" RunAcubeExe="True" RunMissing="false" SaveAll="false" ShellWindowsState="True" Singlefile="false" />

Note: No changes needed for the Seismic PRAQuant file. However, this comparison table is provided to show that the entry for `NoSendFailureList="True"` already existed in the SPRA PRAQuant file for the DG Liner LAR.

Table 3a-9
Identification of Changes in Seismic PRA LERF PRAQuant File for Nominal Cases

2	<Model FaultTreeFile="H1_IxxS_REV_8_ASM.caf" DatabaseFile="H1_CBM_REV_8_ASM.rr" RecoveryFile="CBM_RECV_U12_REV_8_SEISMIC.recv" MasterFlagFile="FRAGILITY.flg" CutsetFile="U1_Cutsets_Seismic\LERF\1E-11\" TrueEvent=".T." FalseEvent=".F." />	<>	2	<Model FaultTreeFile="H1_IxxS_REV_8_ASM.caf" DatabaseFile="H1_CBM_REV_8_ASM.rr" RecoveryFile="CBM_RECV_U12_REV_8_SEISMIC.recv" MasterFlagFile="FRAGILITY.flg" CutsetFile="U1_Cutsets_Seismic-PC\LERF\1E-11\" TrueEvent=".T." FalseEvent=".F." />

Table 3a-9 (continued)
Identification of Changes in Seismic PRA LERF PRAQuant File for Nominal Cases

3	<Options ACUBECount="500000" ACUBEEnabled="false" ACUBEOpts="/IMP /N" ClearLog="true" CurrentQuantifier="Quant_FTREX64-SEIS" DeleCurVal="true" ExpandMods="false" NoSendFailureList="True" RunAcubeExe="True" RunMissing="false" SaveAll="false" ShellWindowsState="True" Singlefile="false" />		3	<Options ACUBECount="500000" ACUBEEnabled="false" ACUBEOpts="/IMP /N" ClearLog="true" CurrentQuantifier="Quant_FTRW6419" DeleCurVal="true" ExpandMods="false" NoSendFailureList="True" RunAcubeExe="True" RunMissing="false" SaveAll="false" ShellWindowsState="True" Singlefile="false" />

Note: No changes needed for the Seismic PRAQuant file. However, this comparison table is provided to show that the entry for `NoSendFailureList="True"` already existed in the SPRA PRAQuant file for the DG Liner LAR.

Table 3a-10
Identification of Changes in Seismic PRA Recovery File for Nominal Cases

		-+	3 4	**SET EVENTS UNKNOWN** *
		-+	6 7	**SET EVENTS TRUE** SEQ_*
		-+	9 10	**SUBSUME** **COMPRESS** 4
		-+	14	**SET EVENTS UNKNOWN**
6	**COMPRESS** 30	<>	17	**COMPRESS** 4
		-+	6155	SEQ_*
6151	**COMPRESS** 1	<>	6162	**COMPRESS** 30

Table 3a-11
Identification of Changes in Fire PRA PRAQuant File for DG OOS Cases

2	<Model FaultTreeFile="..\H1_CBM_REV_8_IFL_ASM.caf" DatabaseFile="..\H1_CBM_REV_8_ASM.rr" MasterFlagFile="..\H1_CBM_REV_8_FLG_ABAO_ASM.FLG" CutsetFile="H1_CBM_REV_8_ABAO\" LogFile="ChangedCheckLog.txt" Initiators="%*" Intiators="%*" LocalFlags="%FLD*=False; %IE*=False; %G*=False" TrueEvent=".T." FalseEvent=".F." />	<>	2	<Model FaultTreeFile="..\H1_CBM_REV_8_IFL_ASM.caf" DatabaseFile="..\H1_CBM_REV_8_ASM.rr" MasterFlagFile="..\H1_CBM_REV_8_FLG_ABAO_ASM.FLG" CutsetFile="H1_CBM_REV_8_ABAO-PC\" LogFile="ChangedCheckLog.txt" Initiators="%*" Intiators="%*" LocalFlags="%FLD*=False; %IE*=False; %G*=False" TrueEvent=".T." FalseEvent=".F." />

Table 3a-11 (continued)
Identification of Changes in Fire PRA PRAQuant File for DG OOS Cases

3	<Options ACUBECount="1000" ACUBEEnabled="false" ClearLog="true" CompressAll="26" CurrentQuantifier="Quant_FTREX1901" CutsetFormat="2" DeleCurVal="true" ExpandMods="true" FalseEvent=".F" MaxRecoveries="6" PruneBeforeFlags="false" RunMissing="false" SaveAll="false" ShellWindowState="1" Singlefile="false" TrueEvent=".T" TruncateToZero="False" />		3	<Options ACUBECount="1000" ACUBEEnabled="false" ClearLog="true" CompressAll="26" CurrentQuantifier="Quant_FTRW6419" CutsetFormat="2" DeleCurVal="true" ExpandMods="true" FalseEvent=".F" MaxRecoveries="6" NoSendFailureList="True" PruneBeforeFlags="false" RunMissing="false" SaveAll="false" ShellWindowState="1" Singlefile="false" TrueEvent=".T" TruncateToZero="False" />

Table 3a-12
Identification of Changes in Fire PRA Recovery File for DG OOS Cases

		-+	3 4	**SET EVENTS UNKNOWN** *
		-+	6 7	**SET EVENTS TRUE** SEQ*
		-+	9 10	**SUBSUME** **COMPRESS** 4
		-+	12 13 14 15 16 17 18 19	**REPLACE EVENTS** MNUN1R43S001C 1.0 CC-DGS-102 **REPLACE EVENTS** MNUN1R43S001C 1.0 CC-DGS-142 **REPLACE EVENTS** MNUN1R43S001C 1.0 CC-DGS-182 **REPLACE EVENTS** MNUN1R43S001C 1.0 CC-DGS-222
		-+	21 22 23 24	**CLEAR RECOVERY FLAGS** **MAX RECOVERIES** 1 ; ; add op action

Table 3a-12 (continued)
Identification of Changes in Fire PRA Recovery File for DG OOS Cases

			25 26 27 28 29	; **CHANGEEVENTS** +OPHE-REC-PSW-F %HF_1101J* SEQ_SBO_28 -OPHE* -CC-SW-1 **CHANGEEVENTS** +OPHE-REC-PSW-F %HF_1101J* SEQ_SBO_5 -OPHE* -CC-SW-1
		-+	31 32	**SET EVENT PROBS** OPHE-REC-PSW-F .05
		-+	34	**COMPRESS** 2
7	**CLEAR RECOVERY FLAGS**	+-		
9 10	**SUBSUME** **COMPRESS** 30	+-		
2478 2479 2480 2481 2482	**CLEAR RECOVERY FLAGS** **MAX RECOVERIES** 1 ; ; add op action ;	+-		

Table 3a-12 (continued)
Identification of Changes in Fire PRA Recovery File for DG OOS Cases

2483 2484 2485 2486	**CHANGEEVENTS** +OPHE-REC-PSW-F %HF_1101J* SEQ_SBO_28 -OPHE* -CC-SW-1 **CHANGEEVENTS** +OPHE-REC-PSW-F %HF_1101J* SEQ_SBO_5 -OPHE* -CC-SW-1			
2488 2489	**SET EVENT PROBS** OPHE-REC-PSW-F .05	+-		
2492	SEQ_*	+-		

Table 3a-13
Identification of Changes in Internal Flood PRA PRAQuant File for DG OOS Cases

2	<Model FaultTreeFile="..\H1_CBM_REV_8_IFL_ASM.CAF" DatabaseFile="..\H1_CBM_REV_8_ASM.rr" MasterFlagFile="..\H1_CBM_REV_8_FLG_ABAO_ASM.FLG" CutsetFile="H1_CBM_REV_8_FLOOD\" LogFile="REV8-1TOP-IL-LOG.txt" Initiators="%*" Intiators="%*" LocalFlags="%HF*=False; %IE*=False; %G*=False" TrueEvent=".T." FalseEvent=".F." />	<>	2	<Model FaultTreeFile="..\H1_CBM_REV_8_IFL_ASM.CAF" DatabaseFile="..\H1_CBM_REV_8_ASM.rr" MasterFlagFile="..\H1_CBM_REV_8_FLG_ABAO_ASM.FLG" CutsetFile="H1_CBM_REV_8_FLOOD-PC\" LogFile="REV8-1TOP-IL-LOG.txt" Initiators="%*" Intiators="%*" LocalFlags="%HF*=False; %IE*=False; %G*=False" TrueEvent=".T." FalseEvent=".F." />

Table 3a-13 (continued)
Identification of Changes in Internal Flood PRA PRAQuant File for DG OOS Cases

3	<Options ACUBECount="1000" ACUBEEnabled="false" ClearLog="true" CompressAll="26" CurrentQuantifier="Quant_FTREX64-SEIS" CutsetFormat="2" DeleCurVal="true" ExpandMods="true" FalseEvent=".F" MaxRecoveries="6" PruneBeforeFlags="false" RunMissing="false" SaveAll="false" ShellWindowState="1" Singlefile="false" TrueEvent=".T" TruncateToZero="False" />		3	<Options ACUBECount="1000" ACUBEEnabled="false" ClearLog="true" CompressAll="26" CurrentQuantifier="Quant_FTRW6419" CutsetFormat="2" DeleCurVal="true" ExpandMods="true" FalseEvent=".F" MaxRecoveries="6" NoSendFailureList="True" PruneBeforeFlags="false" RunMissing="false" SaveAll="false" ShellWindowState="1" Singlefile="false" TrueEvent=".T" TruncateToZero="False" />

Table 3a-14
Identification of Changes in Internal Flood PRA Recovery File for DG OOS Cases

		-+	3 4	**SET EVENTS UNKNOWN** *
		-+	6 7	**SET EVENTS TRUE** SEQ_*
		-+	9 10	**SUBSUME** **COMPRESS** 4
		-+	12 13 14 15 16 17 18 19	**REPLACE EVENTS** MNUN1R43S001C 1.0 CC-DGS-102 **REPLACE EVENTS** MNUN1R43S001C 1.0 CC-DGS-142 **REPLACE EVENTS** MNUN1R43S001C 1.0 CC-DGS-182 **REPLACE EVENTS** MNUN1R43S001C 1.0 CC-DGS-222
		-+	21	**COMPRESS** 2
		-+	23	**CLEAR RECOVERY FLAGS**

Table 3a-14 (continued)
Identification of Changes in Internal Flood PRA Recovery File for DG OOS Cases

		-+	25	;Remove illegitimate cutsets. These cutsets have OSP recovery successful on the success branch of the sequence but no credit for OSP recovery on the failure branch
		-+	27 28 29	**RECOVERY** DEL 0 SEQ_LOSP-2 SEQ_OSPREC OPHE* SEQ_LOSP-5 SEQ_OSPREC OPHE*
		-+	36 37	**SET EVENTS UNKNOWN** *
10	**COMPRESS** 30	<>	42	**COMPRESS** 4
		-+	94	;These cutsets conservatively applied a 5 hour OSP recovery when 10 hours is warranted
		-+	96	**MAX RECOVERIES** 1

Table 3a-14 (continued)
Identification of Changes in Internal Flood PRA Recovery File for DG OOS Cases

			97	**RECOVERY** NR-OSP-5to10H 0.523
			98	SEQ_LOSP-9 CONSEQ-NR1-5H
			99	SEQ_GT_10 CONSEQ-NR1-5H
			100	SEQ_GT_3 CONSEQ-NR1-5H
			101	SEQ_LOSP-13 CONSEQ-NR1-5H
			102	SEQ_LOSP-16 CONSEQ-NR1-5H
			103	SEQ_GT_16 CONSEQ-NR1-5H
			104	SEQ_LOSP-22 CONSEQ-NR1-5H
			105	SEQ_LOSP-19 CONSEQ-NR1-5H
			106	SEQ_GT_22 CONSEQ-NR1-5H
			107	SEQ_GT_19 CONSEQ-NR1-5H
			108	SEQ_LOSP-9 ZNR-OSP-5H
			109	SEQ_GT_10 ZNR-OSP-5H
			110	SEQ_GT_3 ZNR-OSP-5H
			111	SEQ_LOSP-13 ZNR-OSP-5H
			112	SEQ_LOSP-16 ZNR-OSP-5H
			113	SEQ_GT_16 ZNR-OSP-5H
			114	SEQ_LOSP-22 ZNR-OSP-5H
			115	SEQ_LOSP-19 ZNR-OSP-5H
			116	SEQ_GT_22 ZNR-OSP-5H
			117	SEQ_GT_19 ZNR-OSP-5H

Table 3a-14 (continued)
Identification of Changes in Internal Flood PRA Recovery File for DG OOS Cases

		-+	119 120	**SUBSUME** **COMPRESS** 4

Table 3a-15
Identification of Changes in Internal Events PRA PRAQuant File for DG OOS Cases

2	<Model FaultTreeFile="..\H1_CBM_REV_8_IFL_ASM.CAF" DatabaseFile="..\H1_CBM_REV_8_ASM.rr" MasterFlagFile="..\H1_CBM_REV_8_FLG_ABAO_ASM.FLG" CutsetFile="H1_CBM_REV_8_FPIE\" LogFile="Rev8-IE-Log.txt" Initiators="%*" Intiators="%*" LocalFlags="%HF*=False; %FLD*=False; %G*=False" TrueEvent=".T." FalseEvent=".F." />	<>	2	<Model FaultTreeFile="..\H1_CBM_REV_8_IFL_ASM.caf" DatabaseFile="..\H1_CBM_REV_8_ASM.rr" MasterFlagFile="..\H1_CBM_REV_8_FLG_ABAO_ASM.FLG" CutsetFile="H1_CBM_REV_8_FPIE-PC\" LogFile="Rev8-IE-Log.txt" Initiators="%*" Intiators="%*" LocalFlags="%HF*=False; %FLD*=False; %G*=False" TrueEvent=".T." FalseEvent=".F." />

Table 3a-15 (continued)
Identification of Changes in Internal Events PRA PRAQuant File for DG OOS Cases

3	<Options ACUBECount="1000" ACUBEEnabled="false" ClearLog="true" CompressAll="26" CurrentQuantifier="Quant_FTREX64-SEIS" CutsetFormat="2" DeleCurVal="true" ExpandMods="true" FalseEvent=".F" MaxRecoveries="6" NoOverrideProbs="false" PruneBeforeFlags="false" RunMissing="false" SaveAll="false" ShellWindowState="1" Singlefile="false" TrueEvent=".T" TruncateToZero="False" />	3	<Options ACUBECount="1000" ACUBEEnabled="false" ClearLog="true" CompressAll="26" CurrentQuantifier="Quant_FTRW6419" CutsetFormat="2" DeleCurVal="true" ExpandMods="true" FalseEvent=".F" NoOverrideProbs="false" NoSendFailureList="True" PruneBeforeFlags="false" RunMissing="false" SaveAll="false" ShellWindowState="1" Singlefile="false" TrueEvent=".T" TruncateToZero="False" />

Table 3a-16
Identification of Changes in Internal Events PRA Recovery File for DG OOS Cases

		-+	3 4	**SET EVENTS UNKNOWN** *
		-+	6 7	**SET EVENTS TRUE** SEQ_*
		-+	9 10	**SUBSUME** **COMPRESS** 4
		-+	12 13 14 15 16 17 18 19 20	**REPLACE EVENTS** MNUN1R43S001C 1.0 CC-DGS-102 **REPLACE EVENTS** MNUN1R43S001C 1.0 CC-DGS-142 **REPLACE EVENTS** MNUN1R43S001C 1.0 CC-DGS-182 **REPLACE EVENTS** MNUN1R43S001C 1.0 CC-DGS-222 **COMPRESS** 2
		-+	22	**CLEAR RECOVERY FLAGS**

Table 3a-16 (continued)
Identification of Changes in Internal Events PRA Recovery File for DG OOS Cases

		-+	24	;Remove illegitimate cutsets. These cutsets have OSP recovery successful on the success branch of the sequence but no credit for OSP recovery on the failure branch
		-+	26 27 28	**RECOVERY** DEL 0 SEQ_LOSP-2 SEQ_OSPREC OPHE* SEQ_LOSP-5 SEQ_OSPREC OPHE*
		-+	33 34	**SET EVENTS UNKNOWN** *
8	**COMPRESS** 30	<>	38	**COMPRESS** 4
		-+	43 44	**REPLACE EVENTS** OPHEELAP-ALTPWR-X 1.0 OPHEELAP-ALTPWR OPHEELAP-ALTPR-FLAG
		-+	58	**COMPRESS** 2

Table 3a-16 (continued)
Identification of Changes in Internal Events PRA Recovery File for DG OOS Cases

26 27	**REPLACE EVENTS** OPHEELAP-ALTPWR-X 1.0 OPHEELAP-ALTPWR OPHEELAP-ALTPR-FLAG	<>	60 61	
		-+	95	;These cutsets conservatively applied a 5 hour OSP recovery when 10 hours is warranted
		-+	97 98 99 100 101 102 103 104 105 106 107 108	**MAX RECOVERIES** 1 **RECOVERY** NR-OSP-5to10H 0.523 SEQ_LOSP-9 CONSEQ-NR1-5H SEQ_GT_10 CONSEQ-NR1-5H SEQ_GT_3 CONSEQ-NR1-5H SEQ_LOSP-13 CONSEQ-NR1-5H SEQ_LOSP-16 CONSEQ-NR1-5H SEQ_GT_16 CONSEQ-NR1-5H SEQ_LOSP-22 CONSEQ-NR1-5H SEQ_LOSP-19 CONSEQ-NR1-5H SEQ_GT_22 CONSEQ-NR1-5H SEQ_GT_19 CONSEQ-NR1-5H

Table 3a-16 (continued)
Identification of Changes in Internal Events PRA Recovery File for DG OOS Cases

			109	SEQ_LOSP-9 ZNR-OSP-5H
			110	SEQ_GT_10 ZNR-OSP-5H
			111	SEQ_GT_3 ZNR-OSP-5H
			112	SEQ_LOSP-13 ZNR-OSP-5H
			113	SEQ_LOSP-16 ZNR-OSP-5H
			114	SEQ_GT_16 ZNR-OSP-5H
			115	SEQ_LOSP-22 ZNR-OSP-5H
			116	SEQ_LOSP-19 ZNR-OSP-5H
			117	SEQ_GT_22 ZNR-OSP-5H
			118	SEQ_GT_19 ZNR-OSP-5H
		-+	120	**SUBSUME**
			121	**COMPRESS** 4

Table 3a-17
Identification of Changes in Seismic PRA Flag File for DG OOS Cases

288 289	;Flag events to lock shared diesel to Unit 1 during 1C outage. Appear in recovery rules so set to 1.0 FL-DG1BALIGN-SPRA EQU .F.	+-		

Note: Flag event `FL-DG1BALIGN-SPRA EQU .F.` was deleted from the updated Flag file on the right hand side.

Table 3a-18
Identification of Changes in Seismic PRA Recovery File for DG OOS Cases

		-+	3 4	**SET EVENTS UNKNOWN** *
		-+	6 7	**SET EVENTS TRUE** SEQ_*
		-+	9 10	**SUBSUME** **COMPRESS** 4
		-+	12 13	**REPLACE EVENTS** MNUN1R43S001C 1.0 CC-DGS-102

Table 3a-18 (continued)
Identification of Changes in Seismic PRA Recovery File for DG OOS Cases

			14 15 16 17 18 19	**REPLACE EVENTS** MNUN1R43S001C 1.0 CC-DGS-142 **REPLACE EVENTS** MNUN1R43S001C 1.0 CC-DGS-182 **REPLACE EVENTS** MNUN1R43S001C 1.0 CC-DGS-222
		-+	21	**COMPRESS** 2
		-+	25	**SET EVENTS UNKNOWN**
6	**COMPRESS** 30	<>	28	**COMPRESS** 4
		-+	6166	SEQ_*
6151	**COMPRESS** 1	<>	6173	**COMPRESS** 30

<u>Response 3b</u>

The sensitivity cases in the response to RAI 3b are focused on the risk impact of DG 1C OOS on all Unit 1 hazard groups because the NRC noted that the DG 1C OOS case evaluation in the DG Liner LAR resulted in a reduction in risk for the seismic hazard, which led to the evaluation of the modeling errors as discussed in RAI 3a. In addition, individual DG OOS cases typically result in relatively high increases in CDF and LERF compared to other single SSC OOS cases, especially for seismic events, which often lead to loss of offsite power. Therefore, the DG OOS case is an appropriate representative case for the purposes of comparing calculated delta seismic CDF and LERF values against seismic penalty values. For similar reasons, the risk impact of DG 2C OOS was quantified to calculate the risk impact on CDF and LERF for all Unit 2 hazard groups.

The left-hand side of Table 3b-1 provides the Unit 1 PRA quantification results from Tables 3.5-1 and 3.5-2 of the DG Liner LAR for the nominal and DG 1C OOS cases. The right-hand side of Table 3b-1 provides the updated results in red text based on the changes in the PRAQuant advanced tab settings, Flag file, and recovery file identified in the response to RAI 3a above. Table 3b-1 shows relatively minor differences in the CDF and LERF results for both the nominal cases and the DG 1C OOS cases.

Table 3b-2 indicates that the increase in risk for the Unit 2 Internal Events and Fire CDF and LERF PRA quantification results for the DG 2C OOS case are higher than the comparable DG 1C OOS cases. Table 3b-2 indicates that the increase in risk for the Internal Flood and Seismic cases are comparable for the DG 2C and DG 1C OOS cases. The seismic CDF and LERF results for the DG OOS cases remain below the seismic CDF and LERF penalty values of 1.18E-06/yr and 2.95E-07/yr, respectively, in the Hatch RICT LAR. As noted in the response to RAI 1, while the seismic CDF penalty value will remain at 1.18EE-06/yr, the seismic LERF penalty value is proposed to be increased from 2.95E-07/yr to 3.66E-07/yr to account for an increased SCLERP value of 0.31.

It is recognized that the increase in FPIE PRA and Fire PRA risk for the Unit 2 DG 2C OOS quantification is higher than the increase in FPIE PRA and Fire PRA risk for the Unit 1 DG 1C OOS quantification. Conservatisms in the Unit 1 DG 1C OOS case quantification were reviewed in detail to support the DG Liner LAR. Some conservatisms in the Unit 1 DG 1C OOS case quantification were reduced to support more realistic quantitative results as needed to support the DG Liner LAR. Potential conservatisms in the Unit 2 DG 2C OOS case quantification were not re-evaluated in detail for the purposes of this RAI response. However, any potential conservatism in the FPIE PRA and Fire PRA risk for the Unit 2 DG 2C OOS case quantification does not alter the conclusion that the seismic CDF and LERF penalty values in the Hatch RICT LAR are not impacted. In addition, the conclusions from the DG Liner LAR are not impacted because the risk impact of DG 2C OOS was not in the scope of the DG Liner LAR.

The identified changes were entered into the SNC Corrective Action Program and are being tracked and integrated into the Hatch PRA model maintenance and update process. Therefore, the identified changes will be accounted for in the hazard PRA models quantified to support the RICT program.

Table 3b-1
Results for Unit 1 Quantification with EDG 1C OOS Cases with Modeling Issues Resolved
(Original results taken from Table 3.5-1 of DG Liner LAR for DG 1C OOS)

Unit 1 EDG 1C Case - ICCDP					*New Results*			*% Change*
PRA Hazard	*CDF_{BASE} (/yr)*	*CDF_{INST} (/yr)*	*Time*	*ICCDP*	*Updated CDF_{BASE} (/yr)*	*Updated CDF_{INST} (/yr)*	*Updated ICCDP*	
Internal Events	5.01E-06	1.09E-05	19 days	3.07E-07	4.84E-06	1.11E-05	3.26E-07	*6%*
Internal Flood	2.38E-07	1.06E-06	19 days	4.28E-08	2.45E-07	1.16E-06	4.76E-08	*11%*
Internal Fire	5.89E-05	7.58E-05	19 days	8.80E-07	5.89E-05	7.59E-05	8.85E-07	*1%*
Seismic	9.53E-07	8.64E-07	19 days	0.00E+00	8.89E-07	9.15E-07	1.35E-09	*NA*
Total Risk	6.51E-05	8.86E-05	19 days	1.23E-06	6.49E-05	8.91E-05	1.26E-06	*3%*

Unit 1 EDG 1C Case - ICLERP					*New Results*			*% Change*
PRA Hazard	*$LERF_{BASE}$ (/yr)*	*$LERF_{INST}$ (/yr)*	*Time*	*ICLERP*	*Updated $LERF_{BASE}$ (/yr)*	*Updated $LERF_{INST}$ (/yr)*	*Updated ICLERP*	
Internal Events	3.66E-07	6.40E-07	19 days	1.43E-08	3.46E-07	6.46E-07	1.56E-08	*9%*
Internal Flood	5.95E-09	2.35E-08	19 days	9.14E-10	6.11E-09	2.66E-08	1.07E-09	*17%*
Internal Fire	3.64E-06	4.05E-06	19 days	2.13E-08	3.64E-06	4.06E-06	2.19E-08	*2%*
Seismic	2.47E-07	2.15E-07	19 days	0.00E+00	2.32E-07	2.38E-07	3.12E-10	*NA*
Total Risk	4.26E-06	4.93E-06	19 days	3.49E-08	4.22E-06	4.97E-06	3.89E-08	*11%*

Table 3b-2
Results for Unit 2 Quantification with EDG 2C OOS Cases with Modeling Issues Resolved

Unit 2 EDG 2C Case – ICCDP (Note 1)					*New Results*			
PRA Hazard	*CDF_{BASE} (/yr)*	*CDF_{INST} (/yr)*	*Time*	*ICCDP*	*Updated CDF_{BASE} (/yr)*	*Updated CDF_{INST} (/yr)*	*Updated ICCDP*	*% Change*
Internal Events	N/A	N/A	N/A	N/A	7.16E-06	5.91E-05	2.70E-06	N/A
Internal Flood	N/A	N/A	N/A	N/A	2.98E-07	1.43E-06	5.89E-08	N/A
Internal Fire	N/A	N/A	N/A	N/A	5.51E-05	9.67E-05	2.17E-06	N/A
Seismic	N/A	N/A	N/A	N/A	8.21E-07	8.46E-07	1.30E-09	N/A
Total Risk	N/A	N/A	N/A	N/A	6.34E-05	1.58E-04	4.93E-06	N/A

Unit 2 EDG 2C Case – ICLERP (Note 1)					*New Results*			
PRA Hazard	*$LERF_{BASE}$ (/yr)*	*$LERF_{INST}$ (/yr)*	*Time*	*ICLERP*	*Updated $LERF_{BASE}$ (/yr)*	*Updated $LERF_{INST}$ (/yr)*	*Updated ICLERP*	*% Change*
Internal Events	N/A	N/A	N/A	N/A	3.49E-07	1.77E-06	7.40E-08	N/A
Internal Flood	N/A	N/A	N/A	N/A	7.05E-09	5.27E-08	2.38E-09	N/A
Internal Fire	N/A	N/A	N/A	N/A	3.62E-06	5.87E-06	1.17E-07	N/A
Seismic	N/A	N/A	N/A	N/A	2.53E-07	2.61E-07	4.16E-10	N/A
Total Risk	N/A	N/A	N/A	N/A	4.23E-06	7.95E-06	1.94E-07	N/A

Unit 2 EDG 2C OOS Case results were not previously quantified because they were not required for the scope of the DG Liner LAR.

<u>Response 3c</u>

Table 3b-1 supports that resolution of the model errors still results in a change in risk for the DG 1C OOS that is bounded by the seismic penalties. Table 3b-2 also supports that resolution of the model errors still results in a change in risk for the DG 1C OOS that is bounded by the seismic penalties. Therefore, the SCDF and SLERF penalties in the Hatch RICT LAR are not affected by the modeling errors and resolutions identified in the response to RAI 3a. As noted in the response to RAI 1, while the seismic CDF penalty value will remain at 1.18EE-06/yr, the seismic LERF penalty value is proposed to be increased from 2.95E-07/yr to 3.66E-07/yr to account for an increased SCLERP value of 0.31.

Refer to the first paragraph in the response to RAI 3b for a discussion of why the DG 1C and DG 2C OOS quantifications are appropriate representative cases for the purposes of comparing calculated delta seismic CDF and LERF values against seismic penalty values.

Response 3d

Refer to Table 3b-1 for the updated information for Tables 3.5-1 and 3.5-2 of the DG Liner LAR for DG 1C OOS for the Unit 1 SPRA quantification results reflecting the resolution of the modeling errors discussed in the response to RAI 3a. As discussed in the response to RAI 3c the changes to the SPRA model identified in the response to RAI 3a do not affect the conclusion regarding the conservatism of the SCDF and SLERF penalty values proposed in the TSTF-505 LAR.

In order to address any remaining uncertainty associated with the seismic penalty and its use for the RICT program, the SCLERP for calculating the seismic LERF penalty will be set at 0.31 using the highest value shown for Case 1b in Table 1-2 in the response to RAI 1. The higher observed SCLERP is being driven by the conservative SPRA model used in the Hatch DG Liner LAR and not due to the resolution of the errors discussed in the responses to RAIs 3a and 3b. For the Hatch RICT LAR, the seismic CDF penalty will remain at 1.18E-06/yr. However, the seismic LERF penalty will be increased from 2.95E-07/yr to 3.66E-07/yr (i.e., 1.18E-06/yr * 0.31 = 3.66E-07/yr).